

Engaging Students in Science: Modeling the “Ways of Thinking and Practice” Of a Scientist to a Large Undergraduate Biology Class

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Abstract

Tertiary institutes provide opportunities for the student to learn the “ways of thinking and practice”¹ of a discipline from experienced experts. In biology, this expertise includes both key practical skills inherent to the discipline, and the cognitive approach scientists employ to solve complex challenges. Authentic-styled laboratory research experiences promote student engagement and allow students to learn these key competencies. These experiences promote student retention and engagement as well as promote deep learning and contextualization of key concepts in STEM subjects, including biology². In many institutions however, the large enrollments of undergraduate classes result in resource constraints that can limit the type of experience offered. We used a cognitive apprenticeship³ styled approach, to design a real-world laboratory scenario that models a research project to facilitate deep conceptual learning within a novel context. Students reported the experience led to greater understanding of theoretical content and integration of complex concepts. In addition, students learnt the nature of the scientific process and research project design. Interestingly, although laboratory sessions were designed for in-person delivery, students perceptions remained unchanged when the sessions were delivered remotely due to covid restrictions. Overall, the design of this practical component promoted student engagement and enhanced student perceptions of the research process and their role as a scientist.

Keywords: cognitive apprenticeship, engagement, experiential-learning, laboratory, research